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V. N. Andreev

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(Izuchenie chislennosti severnykh olenei i putei ikh migratsii s pomoshch'yu aerometodov)

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THE STUDY OF REINDEER POPULATIONS AND MIGRATION ROUTES BY AERIAL METHODS

(Izuchenie chislennosti severnykh olenei i putei ikh migratsii s pomoshch'yu aerometodov)

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Seventy-five percent of the world population of domestic reindeer and, apparently, not less than 50—60% of that of wild reindeer are concentrated in the Soviet Union.

For efficient exploitation of both domestic and wild reindeer a thorough assessment of their numbers is first essential. In reindeer breeding this problem is being more or less satisfactorily resolved by means of systematic stock-taking of the deer at the time of their admission into special enclosures. However, no population census of wild deer has yet been carried out in commercial farming, nor have their migration routes and distribution been sufficiently studied. Clarification of these problems is fundamental to the study of this most important species of the fauna of the Far North and for the economical organization of reindeer farming.

In the USSR the highest concentration of wild reindeer is to be found on the Taimyr Peninsula and the adjacent areas of the northern part of the Central Siberian plateau. P. E. Terletskii (1932) set the numbers of wild deer in this territory at 60,000 head, while I. V. Druri (1949) noted no less than 350,000. Some experts consider even this number an underestimation and surmise 500,000. We do not have objective data on the population of wild reindeer in the USSR and all the above-cited figures are very unreliable.

The following special features of the life of wild deer make censusing particularly difficult. They live in completely uninhabited places, even avoiding those frequented by nomadic reindeer-breeders and hunters. Wild deer are very mobile and often journey several tens of kilometers in a day. They cover huge expanses of pastureland, and their migration routes vary. During the greater part of the year wild deer stray in small groups, gathering in large herds only in summer, when mosquitoes are in abundance, or sometimes during autumn or spring migrations. They are extremely timid and flee from the approach of man. Moreover, it must be noted that as a result of various natural calamities, there are considerable fluctuations in the number of wild deer in certain years. Ground methods of censusing wild deer are very labor-consuming and cannot yield reliable data.

In view of the above, the attention of investigators has long since been drawn to aerial methods. I suggested in 1937 (Andreev, 1937) to organize a reindeer census with the aid of aerial photography. However,

a practical application of aerial methods for censusing reindeer was first discovered in Canada. The importance of such methods for censusing caribou was noted by many investigators in northern North America (Buckley, 1954; Kelsall, 1955; Banfield, 1956, 1957, and others). In 1949 an aerial census of caribou was carried out over the area between Mackenzie and Hudson Bay, the number of animals determined being 670,000. A second count in the area in 1955 showed a drop in the caribou population to 277,000 (Banfield, 1956, 1957), and a third survey in 1958 revealed a further drop. The census was conducted from a height of 150 m and embraced the areas of densest concentration. A visual census of single animals was made simultaneously with aerial photography in places of the largest aggregations. On my Canadian trip in 1959 I discovered that the visual census of caribou, because of its great economic importance to the native population of the Canadian north, is applied fairly widely with airplanes and helicopters. However, observations of this kind are mainly of a practical nature, and conclusions are rarely drawn from their results.

In 1958 aerial methods were used by the Scientific Research Institute of Agriculture of the Far North within the framework of preparations for censusing wild reindeer inhabiting the Taimyr Peninsula. On these flights scientific coworkers M. Kh. Geller, E. I. Gorbunov, M. A. Sergeev, and photographer Yu. Ya. Ledin took part in the census together with the author; an AN-2* airplane was used.

We were faced with two main problems concerning the census methods: 1) when to use photography, and when to confine ourselves to visual observations, i.e., in which circumstances photography would give better results; and 2) how the flights should be organized to give a maximum count of deer with a minimum amount of flying time.

The experimental work yielded results requiring further refinement. We resolved the problem of combining visual and photographic methods as follows. To obtain completely objective documentary data it is desirable to use photography for revealing both large aggregations and isolated groups. However, single animals and small groups of up to 30—40 head can be visually counted with accuracy. From a height of 200—300 m we calculated numbers of deer in groups of up to 40 head. In similar assessments, carried out by other persons, the figures for both the overall number of animals and the population composition (adults and young) are identical. In assessments of groups numbering over 40 head there were frequent discrepancies in the calculations of different census-takers. To avoid inaccuracy and for a more precise assessment of deer in larger groups, it is essential to use photographic methods.

We conducted photographic experiments in April, May, July, and September. Conditions for surveying are most favorable in spring, as during this period most regions of the Far North have their greatest number of clear days. Snow still lies everywhere, and upon this background the silhouette of each animal is particularly well defined.

The Canadian investigators also noted that optimum conditions for observing and photographing caribou occur at the end of the Arctic winter, i.e., in April and May (Caribou Investigation, 1951); in summer and

* [Antonov-2 aircraft]

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autumn, conditions are impaired since some animals are camouflaged among the shrub overgrowth. Aerial photography may be interrupted for a considerable time, especially in autumn, by unfavorable weather. Photographs, however, are a convenient means of counting deer and can be taken in any season. From aboard an AN-2 aircraft, pictures have been taken with various kinds of photographic equipment: manual aerial photographic surveying apparatus with a medium-focus lens and a frame measuring 13×18 (AFA 27-t), a "Kiev" cinecamera (KC-16-2), and others. Results showed that photographs taken from a height of less than 150 m clearly distinguish basic groups of deer in terms of sex and stage of maturity (bucks, does, yearlings, calves). On pictures taken without a telescopic lens from a higher altitude (up to 600—700 m), only the general population density can be calculated, without differentiation into separate groups.

At speeds of 150—170 km/hr from a height of 150 m and at longer exposures than 1/200—1/250 sec, images are blurred, even when both aircraft and deer are moving in the same direction.

Vertical and horizontal photographs are each of value for counting deer. With vertical ones there is less likelihood that the view of some deer will be obstructed either by other deer or by bushes, or by the unevenness of small forms of relief. On the other hand, it is far more difficult to perceive sex and growth distinctions on vertical photographs than on horizontal ones. In our opinion, the best conditions for counting deer are afforded by vertical photographs, taken at an inclination of the optical axis of the camera within the range of 20—30°. Since some animals, particularly young deer, may be omitted from a picture because of an obstructed view, closely packed herds should be photographed two or three times in the space of a few minutes — the animals are constantly shifting position and successive pictures should show animals which did not appear in the first photograph. A large herd can be fully covered in a few pictures which overlap by not less than 50%.

While we were flying over Taimyr at a height of over 200 m, certain groups of deer behaved quite calmly, but when we brought our plane down to 50 m they began to flee. Large herds showed greater agitation in summertime, even if the aircraft was flying at 400—500 m.

The distance from which deer become perceptible in the tundra depends on several factors: the relief of the surroundings, the density and compactness of the herd, their mode of behavior, visibility conditions, and the height of the aircraft. At a height of 150 m above level tundra a large herd can be spotted at a distance of 5—6 km, isolated running groups from a distance of 5 km, small mobile groups from 3 km, and single animals usually only within the immediate vicinity of the line of flight.

For censusing deer by aerial photographs, the prints are enlarged to the maximum. In the case of a large number of animals the print is placed under a transparent plate or paper sectioned into squares. It is advisable that each square cover no more than 15—20 animals; animals which are between two or more squares are counted as belonging to the one where the head or greater part of the body appears.

The arrangement of the flight itineraries is most important; obviously, to cover the vast expanses of deer-inhabited territory at once is impossible yet if flights are prolonged, the great mobility of wild deer and their

nging migration routes will inevitably mean that parts of the population
l be omitted from the survey, and others will be recorded twice.
It should be noted that a study of the biological characteristics of wild
er is necessary if aerial photography is to be successful. Most important
to know the trend of migrations, the animals' distribution in various
asons of the year, and the places and times of their greatest concentrations.
In connection with these problems, aerial methods will give the fullest
ta in the shortest possible time. For this reason, census work should
preceded by reconnaissance flights aimed at establishing the character-
ic features of distribution and migration routes. These flights will help
confirm data of a questionable nature and those of ground studies.
For example, on our reconnaissance flights over Taimyr in April and
ay, we discovered that it was the does who first started to move north in
e direction of summer pastures, hurrying as much as possible to reach
em before calving. This is because calves hamper the movement of deer,
d if a calf is born far from the summer pastures there is a danger that
e deer will not manage to reach them in time.
The remaining animals begin moving north after the does. They keep
rictly to the areas where there are thawed patches and food is more easily
tainable, gradually moving further northward as the ground thaws. As
e thaw becomes more general, their movement speeds up, and at the end
May we noticed that isolated groups were journeying 10—15 km per day.
At calving time (end of April, May, and beginning of June) does gather
gether in certain places. Each year pilots of the civil air fleet observe
rge aggregations of wild reindeer in the hilly tundra to the east of
urukhansk; they remain in these regions for summer pasture. Canadian
vestigators report considerable aggregations during the calving period.
In summer in the northern regions of the Taimyr Peninsula wild deer
e concentrated predominantly along the coastal strip; as a result, large
oups are sometimes seen during times of mass mosquito occurrence.
n 22 July photographs were taken of a herd (about 3,000 head) assembled
n the brow of a hill in an area of melting snows in the Arctic tundra. On
ie same day, aggregations of deer were noted to the east of the lower
eaches of the River Pyasina on the western spurs of the Byrranga Mountains.
t the onset of cold weather deer disperse into small groups over the
asturelands.
In autumn too, when wild deer migrate southward from summer
astures in northern Taimyr, we observed considerable aggregations,
specially near large rivers that had not frozen over, where herds of
nany thousands gather, waiting to cross.
On the basis of these data, it is seen that censusing wild deer is best
arried out during times of their densest concentration. In summer, in
ie summer pasture areas of northern Taimyr, quite large aggregations
f deer can be photographed in a relatively short space of time. On the
ther hand, single deer or small groups can be recorded only by
andom counts. It is advisable to conduct additional counts in spring,
t calving time, and in autumn along the most important migration routes,
aying special attention to aggregations near crossing points of rivers.
Thus, wild reindeer populations can best be censused by aerial methods.
n view of this, it is important to fully cover all the places of concentration
n the various seasons, and to make a selective survey in areas where the
eer are scattered.

After our reconnaissance flights in 1958 and summer 1959, undertal by specialists of the Krasnoyarsk Territory Game Inspection and the Scientific Research Institute of Agriculture of the Far North, an investiga was carried out with the aid of aerial methods on the summer grounds of the Taimyr Peninsula, where 90,000 wild deer were found. Consid the inevitable omissions (which amount to approximately 20%) in the experiments of the Canadian researchers (Banfield, 1956), it should b noted that no less than 100,000—110,000 wild deer roam over the Taim Peninsula pasturelands.

In conclusion, a study is necessary of the migration routes of wild and of the populations of deer inhabiting the northern part of the Centra Siberian plateau.

In addition to aerial methods, it is essential to carry out ground stu of the biology of deer, their diseases and parasites, their mutual relat ships with domestic reindeer and other species of the biocenoses of hil and forest tundra, and, also, the effect of wild deer on the state of veget

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N. M. Kovyazin

SOME PROBLEMS OF DEER-BREEDING DEVELOPMENT IN THE NENETS NATIONAL DISTRICT

(Nekotorye problemy razvitiya olenevodstva v Nenetskom natsional'nom okruge)

Translated from Russian
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SOME PROBLEMS OF DEER-BREEDING DEVELOPMENT IN THE NENETS NATIONAL DISTRICT

(Nekotorye problemy razvitiya olenevodstva v Nenetskom natsional'nom okruge)

N.M.KOVYAZIN

Deer breeding is the major agricultural branch in the Nenets National District. Eight per cent of all deer in the extreme North are found in this district. Mainly productive deer breeding is developed here, characterized by large herds and a high percentage of female animals. Deer breeding is of great importance for the human population. As in ancient times, deer on the tundra serve as draught animals in hunting and fishing; they are indispensable for transportation in the tending of deer herds. Deer supply the population of the district with meat for food, and with hides for making clothes and footwear. By-products of the deer-breeding industry provide animal-breeding farms with a considerable portion of feeds. The income from deer breeding amounts to more than 24% of the total fiscal income yielded by all branches of agriculture and industry.

The total head of deer in the district on 1 January 1964 was 165,900. The distribution in various categories of the economic structure in the period 1940 to 1963 is given in Table 1.

TABLE 1

Year	1940	1958	1960	1962	1963
Total head of deer (in thousands)	159.8	150.7	166.3	164.7	165.9
Percentage distribution:					
sovkhozes and state institutions	21.0	14.6	14.9	14.8	15.2
kolkhozes (collective farms)	36.4	70.3	71.9	72.9	73.3
collective farmers	33.7	12.8	11.1	10.5	10.0
individual farmers	—	0.3	0.2	0.1	0.1
workers and administrative personnel	8.9	2.0	1.9	1.7	1.4

As the above figures show, almost 9/10 of the total number of deer are under public ownership. The numbers in kolkhozes and sovkhozes increased during the period 1940 to 1963 by more than half, while numbers kept by collective farmers decreased by two thirds; the number kept by workmen, employees and individual farmers fell to one sixth. Through

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the assistance of the state, deer breeding in the district has progressed through an increase in the number of animals and the recorded rise in their productivity.

Available data indicate, however, that the annual increment in numbers of deer falls considerably below what could conceivably be attained. This is due to a number of circumstances, principally the question of the use of deer pastures pending between the Nenets District and the Komi ASSR. This has resulted in insufficient winter pastures for deer in the district. This state of affairs has made an accelerated growth of deer herds very difficult at present.

The efficient distribution of deer according to territories in the district is of great importance for the development of deer breeding. Distribution of deer in communal ownership for 1963 is shown in Table 2.

TABLE 2

	Total for district	Areas		
		Kanin-Timanskii	Bol'she-zemel'skii	Lower Pechora
Number of animals.	146, 853	54, 092	56,104	36,657
In %.	100	36.8	38.3	24.9

As can be seen from Table 2, over one third of the deer inhabit the Bol'shezemel'skii area; next in population density are the Kanin-Timanskii and Lower Pechora areas. This distribution of deer is a result of uneven supply of available pastures in these regions.

Increases in numbers of animals depend in great measure on the composition of the herds. Higher percentages of female deer in the herd, coupled with the proper organization of pasturing, can ensure considerable natural increases in the herds. The sex and age composition of deer herds in the district has been characterized in recent years by a comparatively high percentage of does (54 – 57 %), a considerable proportion of $1\frac{1}{2}$—2-year-old animals (20—25 %) and a high percentage of draught deer.

With such a low percentage of barren females and a high degree of conservation of both young and adult deer, annual herd increases of up to 20 to 25 % are possible. The total of female deer for 1963 compared with 1954 and 1955 shows that the total numbers of female animals increased in 1963 by almost 5 %. This is a result of considerable zootechnical work on improvement of herd composition. Since 1957 female numbers have remained stable or even declined somewhat. This can be overcome by decreasing numbers of deer in the draught herds which number about 20,000 head. Given more efficient methods of herd-tending, proper organization of deer pasturing, and settlement of the pasture dispute between the Nenets District and the Komi ASSR which would shorten migration routes (now 1000 to 1500 km), the numbers of draught deer could be considerably reduced.

Control of population density in accordance with the available food stocks is an important factor for the proper utilization of pastures and for

raising work productivity. At present, the average density for the district is 11 head per 1000 hectare of pasture.

Considerable variations in utilization of pastures are found among the different kolkhozes; some practice intensive pasture utilization, others less intensive. For example, in the Rossiya, Timanets and Put' Il'icha kolkhozes the density is 17 head per 1000 ha, but in Put' k Kommunizmu, Severnyi Polyus and Druzhba Narodov kolkhozes, only 6 to 8 head.

Together with the increase in numbers, the productive capacity of deer herds is on the rise. Thus, bulk produce of deer meat (live weight) for the whole district in 1961 was 18 centners per 100 deer; in 1963 it was 23 centners, roughly the amount produced in 1958 by deer breeders of the Magadan Region. The meat yield per 100 deer in the kolkhozes (23 centners) is two thirds that of the sovkhozes (35 centners). Even the leading kolkhozes have not attained the productive level of the sovkhozes. For instance, in 1963 the bulk meat produce was 28 centners per 100 head on Put' k Kommunizmu kolkhoz, 27 centners on Rossiya kolkhoz and 28 centners on im. Vyucheiskogo kolkhoz.

The increases in numbers and productivity of animals have resulted in greater gross output and more salable goods. In 1962 the collective and state farms produced over 28,000 centners of venison (live weight), three quarters of which came from kolkhozes, and one seventh from sovkhozes.

About 70% of the gross output of meat is handed over to the State or sold by the collective and state farms on the market. The amount of salable meat produced by the district kolkhozes has been rising rapidly. For example the Nar'yan-Ty, im. Vyucheiskogo, and Krasnyi Oktyabr' kolkhozes raised their production from 30 – 40% in 1961 to 60 – 70% in 1962. Rapid increase of salable goods is an index of successful deer breeding in the above kolkhozes.

Deer breeding in the district is highly profitable due to the low cost of production of deer meat. From figures supplied by the Statistical Board of the Nenets National District, the expenditure on deer meat production in 1962 was 719,000 rubles while the income from marketing of produce was 1,352,000 rubles; thus the income is 2.5 times the expenditure. Comparison of the cost of production of venison with that of beef shows the great economic superiority of venison. In 1963, a centner of venison cost about 35 rubles to produce while beef cost 117 rubles 60 kopeks or 3.5 times more than venison. Eighty percent of venison production expenditure is allotted to wages.

However, deer breeding in the Nenets District does have serious shortcomings. First and foremost, female barrenness is high (6.6% in 1962), and also calf mortality (5.8% of young born). Total loss was 29,000 head in 1961, 19,000 in 1962 and 18,600 in 1963 (about 11.2% of the total deer); the losses in kolkhozes were twice as high as in sovkhozes. One of the causes of the high mortality is the great distances between winter and summer pastures. For example, the distances that had to be covered in Krasnyi Oktyabr', Rassvet Severa, and Put' k Kommunizmu kolkhozes in 1962 were twice the average for kolkhozes and four times the district average (in these kolkhozes pasture grounds stretch over a distance of up to 1,000 – 1,500 km).

At the present time winter pastures in kolkhozes and sovkhozes occupy an area of 16,648,000 ha, of which 13,326,000 ha are actually usable. Deer

pastures of the district are situated in several administrative regions; the spring, summer and autumn pastures are within the district territory, and the winter pastures mainly in the forests of the Komi ASSR, in the Tyumen Region, and within the territory of the Mezen' District of the Archangel Region. More than 27 % of the pastures are located in the Komi ASSR, 6 % in the Archangel Region, and 3 % in the Tyumen Region. Thus more than a third of the pastures of the district is outside its borders. Though the deer of the district are assured plentiful green forage during the summer, early autumn and late spring, they are extremely ill-provided with reindeer moss feeds, which are especially insufficient in the early spring and winter seasons. This condition is rendered even more serious by the inadequate organization of the pasturage territory. Thus, for example, in the Bol'shezemel'skaya Tundra the following large pasturage areas have been allotted to the district herds:

1. The Adz'va pasturage area stretches in a narrow strip from the winter forest pastures, located along the Lem-Yu, Kozhva, and Lyzha rivers in the Komi ASSR, to the summer pastures on the shore of the Kara Sea in the area of Pai-Khoi. The winter pastures are in the forest-tundra.

The pastures well provided with reindeer moss are forested, and protected from snowstorms. The snowcover is never deeper than 70–80 cm. Early spring pastures are in the upper reaches of the Makarikha River and along the middle course of the Adz'va River. Reindeer moss here has been considerably trampled down.

2. The Kolva area extends in a narrow strip parallel to the Adz'va area from the Kara Sea shore to the winter stations in the vicinity of Izhma village. Winter pastures are in the taiga, in the upper reaches of the Kozhva and Lyzha rivers, along the Sabys' and Kucha rivers, through pine and spruce—lichen woods with reindeer moss 5—6 cm high. Calving takes place on pastures of low quality, some 350 to 400 km from the summer pastures. The summer pastures are on the shores of the Kara Sea.

3. The Tavrov-Yanevskii area extends from the uplands of Tavrov-Khoi and Yanei in the north to the forests on the banks of the Vad'ma, Zverinets, Mutnaya, Lebed', Denisovka, Labazikha, Kozhva and other rivers in the south. The reindeer moss cover is well developed, having an average height of 4 cm. Calving pastures are 300 km distant from the winter pastures, and are located on the tundra upland lying between the Kolva and Lai. Summer pastures are on the Yanei heights. On the migratory routes along this stretch reindeer moss growths are trampled down, causing difficulties during the migration from pastures.

4. The Vankurei area extends partly over to the left bank of the Pechora River. It is in the forest-tundra region; forestation of winter stations is considerable and reindeer moss is of good quality and height. Calving takes place in the forest-tundra and partly in sparse woods (around the Shchuch'ya and Kuya rivers and their tributaries). Part of the calving area is dominated by dwarf shrub and bare tundra. The main disadvantage of these pastures is that the reindeer moss is considerably damaged. The summer pastures are on the Vankurei Upland.

5. The Tundra area is entirely within the tundra zone. The winter pasturage area is in the southern tundra in the upper reaches of the middle course of the Chernaya and Shapkina rivers. Winter pasturage conditions

are even worse here since reindeer moss reserves are small; but green plants abound under the snow. The climate is severe and the snowcover is dense. Part of the herds pasture on the Pai-Khoi, and part on the Yanei and Vankurei.

Among the above pasture lands of the district are located the pastures of deer herds of the Komi ASSR, which greatly exceed in area the winter pastures of the Nenets District kolkhozes.

In the western part of the district, separate distant strips of uncultivated land are employed for pasturing; this arrangement makes the proper utilization of pasture lands extremely difficult.

These conditions present several serious obstacles to the systematic improvement and increase of deer herds in the district. The main prerequisite for further development of deer breeding is the provision of sufficient pasture area in all seasons of the year, and rational use of pastures. For this, the land settlement administration must allot pastures of the Bol'shezemel'skaya Tundra to the Komi ASSR and to the Nenets National District. This would end the practice of strip pastures, shorten the migration routes and facilitate parcelization of new distinct pastures for specific kolkhozes; all this on the basis of a thorough quantitative and qualitative survey and assessment of lands. In the region of Timanskii and Malozemel'skaya tundras, where the pastures of Kharp, Nar'yan-Ty and im. Vyucheiskogo kolkhozes, and of Indigskii sovkhoz, the agricultural station, etc., are situated, the use of strip pastures must be done away with by redistribution among these farms.

Another important task is the improvement of the working and living conditions of the herdsmen by establishing intermediate bases in every kolkhoz, and by transferring the herdsmen to a settled way of life. By now 800 small houses have been built in which the Nentsy live with their families. However, complete settlement of the Nentsy has not been accomplished. The data for the year 1962 indicate that one herdsman tends an average of 173 deer on the tundra. For pasturing 165,000 head the kolkhozes allocate 600 herdsmen, and the sovkhozes 340 herdsmen. Usually the herdsman while traveling is accompanied by some members of his family. Thus, as many as 1,500 to 2,000 people, or 25 – 30% of the entire village population, are in a constant nomadic state. Such a situation cannot be regarded as normal. This section of the population must also be settled in order to facilitate the organization of supply and services to herdsmen. For the settlement of herdsmen, deer would have to be pastured in shifts with the work corps divided into two sections, so that each section guards deer for a fixed period during which the other section works at the settlement base. Development of supplementary farming branches at the base is necessary.

This new pasturing technique solves several problems. Deer breeders are able to be constantly with the herd; the work corps requires fewer transport sleighs, less harness and other equipment; the number of draught animals is halved, with a proportionate increase in the number of female animals; guarding of deer is more efficient and productivity of deer breeding is enhanced; production of meat and income yielded by deer breeding markedly increase. For instance, in 1960 the fifth work corps of Nar'yan-Ty kolkhoz achieved a record of 97% survival of adult animals in the herd and an increase of 87 calves per 100 females; the corresponding figures for

1962 were 97.8 and 83.5 %, for 1963, 98.6 and 88.2 %. Transfer of deer breeders to settled life is planned for all the kolkhozes in the district. The main difficulties in implementing this plan are the lack of bases in some kolkhozes for the settlement of herdsmen and for effective means of transportation when transferring them to and from herds.

Proper living conditions for the herdsmen are necessary to assure an improvement in their work productivity. Light, spacious and warm cottages of small size, easily dismantled, must be built for the tundra deer breeders, and supplied with the necessary furniture and household implements, adapted to easy transport. For the transportation of a dismantled cottage, household effects and various chattels, a tractor or a roadworthy and maneuverable cross-country vehicle is required.

The introduction of mechanical transport and progressive methods of deer pasturing will relieve a number of herdsmen and make them available for work in other branches of the district economy. Even now, where herdsmen have switched to a settled way of life through the introduction of shifts in deer pasturing, additional manpower is available for other work.

Experience in deer pasturing gained by the herdsmen at the im. Lenin kolkhoz in the Chukchi District provided with transportable cottages and with tractors shows that mechanization of labor-consuming processes in deer breeding yields good results. Mechanized work corps are capable of moving 20 to 30 times in one season (the usual numbers are 2 – 3 times), taking the deer to better pastures and thus achieving higher levels of productivity.

The implementation of the measures suggested will ensure rapid advances in deer breeding, and assist in solving problems of national economy as posed by the XXII conference of the Communist Party of the Soviet Union.

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